EXHIBIT A

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

ORACLE AMERICA, INC., Plaintiff, v. GOOGLE, INC., Defendant.	Case No. CV 10-03561 WHA

EXPERT REPORT OF DR. ALAN J. COX

Revised October 21, 2011 and November 25, 2011

HIGHLY CONFIDENTIAL
SUBJECT TO PROTECTIVE ORDER

Even if I were asked to assume there was a lost license fee, I disagree with Dr. Cockburn's conclusions regarding the value of that license. I provide a more complete analysis of the licensing landscape below.

In the following sections, I will address damages in this matter due Google's alleged infringement of material covered by Oracle's API claim, since I have already determined that evidence indicates that the material covered by the file claim were easily replaced or worked around and therefore had no value. I describe the relative importance of the material covered by the alleged API claim with the contribution of Google's efforts and resources. I also consider other factors that had an impact on Google's success. Given the overwhelming importance of these other factors, I find that a reasonable remedy for Oracle's API claim is also an award of zero damages. However, I review Dr. Cockburn's copyright damages. Without accepting that a damages award is appropriate, I make adjustments to his calculations that lead to much more reasonable, though still high, damages.

I will address each of the three damages theories on which Dr. Cockburn has opined in his report – Google's allegedly wrongful profits attributable to the purported infringement, Oracle's actual lost profit damages, and Oracle's lost license fee. For each damages theory, I will address both my opinions on damages as well as my critique of Dr. Cockburn's calculation of damages.

A. Reasons for the Success of the Android Platform

I now review some of the elements of Android's success that are due to Google's contributions. The evidence demonstrates that the success of the Android architecture is almost entirely, if not entirely, due to Google. At the very least this evidence, weighed against the evidence provided by Dr. Cockburn, indicates that Dr. Cockburn's measure of the contribution of the API claim is too speculative to merit an award of damages.

1. Google's Decision to Make Android Open Source Was an Important Contributor to the Success of the Platform

A very important contributor to Android's success is Google's decision to make Android available as open source software.[54] By making the source code available and establishing the Open Handset Alliance, Google allowed companies with a stake in an efficient mobile operating system with particular features to participate in the development of the operating systems. By participating in the development of the operating system, members generally improved the chance that the system would meet their specifications, would continue to improve, and would allow features that might be important to that company. Google described these benefits: "Our primary purpose is to build an excellent software platform for everyday users. A number of companies have committed many engineers to achieve this goal, and the result is a full production quality consumer product whose source is open for customization and porting."[55]

Sun recognized the benefits to open-sourcing when it decided to open source its Java SE and Java ME platforms. According to an interview with James Gosling, Vice President and Sun Fellow, he expected that open sourcing would improve collaboration among stake-holders in the development of these programs. He recognized the interest that programmers had in finding and fixing bugs. He also mentioned the ability of contributors to add new features.[56] These observations are consistent with those found in the academic literature.[57]

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[54] I understand that although Java and Android have both been released under open source software licenses, Java is licensed under the GNU General Public License version 2 (with an exception known as a "linking exception"), and most of the Android platform (other than the Linux kernel) is licensed under the Apache License, version 2.0. The GPL is a so-called "copyleft" license that requires any modifications in distributed products to be made available in source code form under GPL terms. The Apache license is "permissive," which allows any developer (such as a handset manufacturer) to incorporate the software in products that are licensed under licensing terms of its own choice. Most handset manufacturers include significant proprietary software in their products, so the more flexible and permissive approach of the Apache 2.0 License helped reduce the intellectual property licensing issues that manufacturers faced in adopting the Android platform. Also, the Apache 2.0 License corresponded to a standard "Contribution License Agreement," which Google also adopted for the Android project. This standard contribution agreement gave handset manufacturers comfort when analyzing the intellectual property licensing terms that applied to contributions they made to the Android project. This, in turn, resulted in robust cooperation among various manufacturers.

[55] Ex. AE - About the Android Open Source Project _ Android Open Source.pdf.

[56] James Gosling on Open Sourcing Sun's Java Platform Implementations, Part 1.

[57] Lerner, Josh, and Jean Tirole, 2002. "Some Simple Economics of Open Source," *Journal of Industrial Economics*, 52 (2), 197-234 and West, Joel and Siobhán O'Mahony, "The Role of Participation Architecture in Growing Sponsored Open Source Communities," *Industry & Innovation*, 15, 2 (April 2008): 145-168, Lakhani, Karim R. and Eric von Hippel, (2003) "How Open Source Software Works: "free" User-to-user Assistance" *Research Policy* 32 (2003) 923–943.

These predictions were borne out. Google itself stated, "[w]e credit Android's rapid adoption to the fact that we made it available under an open source license."[58] Outside observers also attributed at least part of the success of Android to open sourcing the platform. An analyst for Jeffries & Company made the point that open sourcing Android facilitated Google entering into partnerships with multiple handset manufacturers and carriers.[59] Android offered handset manufacturers such as Motorola, Samsung, LG, and HTC a way to better compete with Apple's iPhone.[60] Handset manufacturers were also able to customize Android for their own purposes, thereby differentiating their product offering from other manufacturers' products and providing a greater diversity of alternatives to consumers.[61]

The resulting adoption of Android by many mobile handset manufacturers and carriers has, in turn, accelerated Android's growth.[62] The mobile handset manufacturers and the carriers have furthered this growth by making a wide range of Android handset models available to consumers, with some at low prices, encouraging first time smartphone purchasers.[63]

Google also set up the Android Market to facilitate distribution of applications. Many of the major applications for the iPhone are also now available for Android.[64] Android rivals the iPhone's developer base because Android is less costly for developers and the open source nature of the Android platform is attractive to developers.[65] Indeed, a Bank of America Merrill Lynch analyst quoted, "Google charges a lower fee at $99/year than Apple ($299/year) for developers

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[58] "Google Android, OC Quarterly Review – Q4 2010," October 12, 2010, GOOGLE-01-00053552-591 at 562.

[59] "Android on Steroid: Google Enters Mobile Market with a Splash; Main. Buy," Jefferies & Company, Inc., September 24, 2008, p. 4.

[60] "Android: On a Bender, Telecom Equipment," Arete Research Services LLP, July 14, 2010, GOOGLE-01-00049780-784 at 780.

[61] "NARRATIVE: Mobile + Android, last updated: 03/18/08," GOOGLE-23-00000001-027 at 003. Also see "Android 101: An Introduction to Android and Android Partnerships, Last Updated: December 2008," GOOGLE-00298438-484 at 476.

[62] "Android Poised to Overtake Symbian as Smartphone Leader," *VNUNet United Kingdom,* January 13, 2011; "Google's Android Mobiles Overtake Global iPhone Sales," *Financial Times,* August 12, 2010; "Finding Value in Android," Bank of America Merrill Lynch, September 9, 2010, GOOGLE-01-00048436-484 at 442.

[63] "Android Poised to Overtake Symbian as Smartphone Leader," *VNUNet United Kingdom,* January 13, 2011; "Android: On a Bender, Telecom Equipment," Arete Research Services LLP, July 14, 2010, GOOGLE-01-00049780-784 at 780.

[64] "Android is Shaking Up the Market," *Sunday Business Post,* October 24, 2010.

[65] "Making Sense of a Fragmented World: Mobile Developer Economics 2010 and Beyond, Insights and Analysis from the Definitive Mobile Developer Survey Plus Benchmarks on the Platform Development Experience," VisionMobile Ltd, July 2010, p. 11.

to deploy their apps. Fewer hurdles to write apps for the Android platform can potentially lead to quicker uptake among developers, in our opinion."[66] Android's Applications Framework (which is largely programmed in C++) also provides an easy-to-work-with environment for developers.[67]

The development environment Android has created for its developers has been well received. A review from one mobile developer summarizes, "Android's platform and developer tools are excellent."[68] Another review confirms, "Android has been gaining the lion's share of interest." It explains, "Android is offering developers a bigger slice of the financial pie and will also block fewer applications, a practice which is winning Apple no friends. If Android can build a solid developer network in the next year [2010], it has a real chance of success."[69]

Android's managers correctly predicted that an open source operating system would be an attractive feature to application developers. In August 2005, the Google Wireless team wrote, "the plan is to beat Microsoft and Symbian to volume by offering an Open Source handset solution."[70] In 2009, when Android saw its market share rise from 0.3% in 2008 to 4.1% in 2009[71], an industry analyst commented, "open source will be key to the growth of mobile platforms, in terms of opening up users to new applications and keeping costs down for manufacturers."[72] The New York Times compared Android to Apple's iOS, noticing, "Unlike Apple, Google has eschewed a review process, allowing any developer to publish an application to the Android Marketplace, its version of the App Store, instantly."[73] Google later commented in a 2010 Android Quarterly Review presentation:

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[66] "Finding Value in Android," Bank of America Merrill Lynch, September 9, 2010, GOOGLE-01-00048436-484 at 471-472.

[67] Interview of Tim Bray; "NARRATIVE: Mobile + Android, last updated: 03/18/08," GOOGLE-23-00000001-027 at 003. Also see "Android 101: An Introduction to Android and Android Partnerships, Last Updated: December 2008," GOOGLE-00298438-484 at 466.

[68] David Green, "Android vs. iPhone Development: A Comparison," Javalobby, July 6, 2009.

[69] Iain Thomson and Shaun Nicholos, "Top 10 highs and lows of 2009," VNUNET United Kingdom, December 24, 2009.

[70] Google Engineering Operation Plan for Q3-2005, Q4-2005, Q1-2006, GOOGLE-01-00062240-48 at GOOGLE-01-00062241.

[71] "Global Smartphone Sales Forecast by Operating System and Region," Strategy Analytics, January 2011.

[72] Iain Thomson, "Android tipped to overtake iPhone by 2012," VNUNET United Kingdom, March 6, 2009.

[73] Jenna Wortham, "Apple's Game Changer, Downloading Now," The New York Times, December 6, 2009.

> We credit Android's rapid adoption to the fact that we made it available under an open source license…Because Google was historically seen as a threat to operators, giving up control was a key component of operators adopting Android. This is one reason Android is considered one of the most commercially successful Linux distribution.[74]

Dr. Cockburn often ignores discussions of the importance of the open source feature, even in the material that he quotes. For instance, in paragraph 475 of the Cockburn Report, he quotes Andy Rubin as saying: "There is no purpose of building an open platform other than to attract third-party developers to it. So anything that we would do to jeopardize the support of third-party developers would be bad for the success of the platform."[75] Dr. Cockburn also cites the following statement by Mr. Rubin: "Third-party developers contribute to the success of a platform by having their companies invest in the platform by basing their businesses on the platform. It was my intention to create an independent third-party developer ecosystem…"[76] While Dr. Cockburn claims that Mr. Rubin is talking about Java when he makes the statements, it appears clear that Mr. Rubin is talking about the concept of preserving advantages of the open source format. From my conversations with Mr. Rubin and other Google employees, it is clear that they believe that it would have been as easy for Google to use other programming languages to develop the Android architecture and that there was a very large community of programmers able to write applications in those alternative languages. This is borne out by the fact that most of the most popular applications are written largely in C or C++, as I show below. The use of the Java programming language does not appear to have enhanced the creation of an open source community of programmers building applications for the Android.

Outside commentators also pointed to the importance of the open source feature to Android's success. For instance, an analyst at Merrill Lynch commented:

> While the proprietary operating systems of Apple and RIM have been very successful, trends suggest that the open source system could have leading consumer market share. Android delivers value by providing: 1) effective integration between hardware, software and applications, 2) a mass market platform that reaches across devices and carriers, [3] a large developer network with growing barriers to entry. With wide adoption including more than 20

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[74] Google Android, OC Quarterly Review – Q4 2010," October 12, 2010, GOOGLE-01-00053552-591 at 562

[75] Cockburn Report, ¶447 Citing Rubin 4/5/2011 Dep. 91:19-23.

[76] *Ibid.* Citing Rubin 4/5/2011 Dep. 24:21 – 25:2.

> manufacturers producing more than 50 phones (up from just three models a year ago), we expect Android phones to continue to gain market share."[77]

Another industry publication "Informa Telecoms & Media" was quoted as saying: "The analyst firm said in a review of the state of the mobile phone operating system market that open source will be key to the growth of mobile platforms, in terms of opening up users to new applications and keeping costs down for manufacturers."[78]

It is also important to remember that the concept of open source software for mobile handset operating systems was a new and unaccepted concept for carriers and therefore a risky proposition for Google: "The concept of a true ecosystem, in which the roles of the various members remain in collaborative balance to achieve mutual benefit by the overall health of the system, is alien to this traditional mobile value system."[79] Android was taking a considerable risk in developing its technology, a risk that was not borne by Sun or Oracle and which would have been the same had Google used C, C++, or Objective C as the programming language used in the Application Framework or the applications.

2. Google's Own Brand Name Created a Great Deal of the Excitement and Public Acceptance around Android.

In addition to the appeal of being open source, the success and adoption of the Android platform also benefited from the Google brand name. For example, one industry analyst stated: "Google has proved that its own brand carries enough leverage to garner support from developers without relying on the Java brand. Google is one of only a handful of technology companies that have the marketing muscle to use this strategy successfully."[80] Another industry analyst commented on the fact that Android handsets were still appealing despite the higher "price tag": "Consumers (and professional users demanding fancier phones from their IT

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[77] "Finding Value in Android," Bank of America Merrill Lynch, September 9, 2010, GOOGLE-01-00048436-484 at 444.

[78] "Android Tipped to Overtake iPhone by 2012," *VNUNet United Kingdom*, March 6, 2009.

[79] "Google's Android Ambition is to Reshape the Mobile Industry, Report Says; But Android Faces Big Problems, Tight Deadlines, Says Report," *Network World Fusion,* January 3, 2008.

[80] Adam Leach, "Smartphone platform profile: Google Android," Ovum, October 9, 2009.

The evidence that other programming languages represent a very acceptable non-infringing alternative is very strong. Languages other than Java provide important applications for the Android platform, Android was written in C++ in its early stages, Java represents a small part of the Android architecture and other smartphone operating systems are written in languages other than the Java programming language. Dr. Cockburn, on the other hand, does not appear to be able to find evidence to support his claim that the Java programming language was important to developing a community of application developers, except to quote Dr. Mitchell.[102] At one point Dr. Cockburn even quotes a single page of a document for the proposition that Java is important to Google.[103] The quotation he cites refers to the rapid growth of the application store, not to Java. In fact, in the entire 40 page document from which Dr. Cockburn extracted that quotation, the word Java does not appear.

If Google had chosen C++ or another alternative to the Java programming language, it would have had to create tools for applications developers.[104] On the other hand, it would not have had to create the Dalvik virtual machine. The incremental cost and time to Google of going with C++ or another programming language other than the Java programming language would not have been significant.[105] In light of this non-infringing alternative, Google would not have been willing to pay much to obtain a copyright license to the APIs. As a result, this reduces the benefits, if any, that could be considered attributable to Google's alleged copyright infringement.

5. The APIs at Issue Contribute a Small Part of the Functionality of the Dalvik Virtual Machine

The APIs that Oracle claims are derivative provide only a small part of the functionality of the Dalvik virtual machine, which in turn is only one part of Android, as was illustrated above. All of the code that enables the Dalvik virtual machine to function is Google code, written by Google (with the exception of the handful of copied files that are so inconsequential and unimportant that they have been removed or rewritten). All of the code for the Dalvik virtual machine is written in C. Similarly, the vast majority of Android that is not the Dalvik virtual machine was developed independently by Google or acquired elsewhere (and in any event is not

[102] See, for instance, Mitchell Report, ¶446.

[103] Footnote 602 of the Cockburn Report.

[104] Interviews of Andy Rubin, Dan Bornstein.

accused of infringement). I understand that Android phones use the Dalvik virtual machine only about a third of the time, when they are running the Java-language applications that have been converted to bytecode. Applications written in native code, which I have shown are the majority of the most popular applications, use technology that is not accused of infringing. Similarly, making phone calls, or browsing the Web, or any number of other activities, do not use technology that is accused of infringing Oracle's API claim. Moreover, the 37 API packages at issue are only a portion of the 150 API packages in the Android core libraries. Many of the other API packages—the ones not at issue—address important functions, such as interacting with the user via a touch screen.

B. Google's Allegedly Wrongful Profits Derived from the Android Platform

1. Overview

The previous review of just some of the large amount of evidence indicates that Google's efforts, business decisions, and brand drove the success of the Android platform. This evidence also demonstrates that the contribution of the material covered by Oracle's API claim provided little in value compared to the elements contributed by Google to the success of the platform. Consequently, a low or zero damage for the alleged copyright infringement is appropriate.

In light of this finding, I now turn to a review of Dr. Cockburn's damage analysis of Google's allegedly wrongful profits attributable to the purported infringement, Oracle's actual lost profit damages, and Oracle's hypothetical license fee.

Dr. Cockburn states that, when calculating allegedly wrongful profits attributable to the purported infringement damages in a copyright infringement case, it is the burden of the plaintiff to prove only the alleged infringer's revenue as the basis of a damage claim and that it is up to the alleged infringer "to prove his or her deductible expenses and the elements of profit attributable to factors other than the copyrighted work."[106] Dr. Cockburn claims, in his determination of Google's allegedly infringing revenues, the entire amount of what Google reports on its Android Profit and Loss statements as Gross Android Ad Revenues, Nexus Phone

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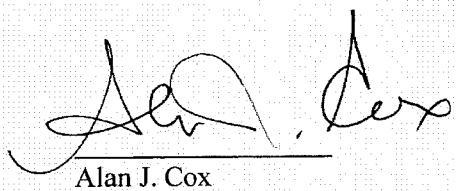
[105] Interviews of Andy Rubin, Dan Bornstein, Brian Swetland.

[106] 17 U.S.C. § 504(b)

are considered, the lost license fee would be $24.1 million, but if the analysis is restricted to sales of accused models only, the lost license fee would reduce to $3.1 million.



Alan J. Cox

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